

very good; one only wishes that he had treated this part of his subject more fully.

The chapter on "Mixing and Nature of Colours" is not as complete as it should be, from the almost entire absence of chemical illustrations, which on such a subject are invaluable. One remark, however, which often occurs in this book is most admirable. "The painter should always make an effort to use as few colours as possible, and they should be of the most permanent kind."

On damage to oil-paintings by gas and damp, it is stated that painter's canvas is usually prepared by first covering one side of it with a coat of whiting, to which glue size has been added. This is hardly a correct statement of the method employed by the best firms. The canvas is treated with size rubbed in with long knives, in the jelly form, it is then scraped off as bare as possible. This is done to protect the canvas from the disintegrating effects of the oil used in the preparation of the surface, for oil oxidises and speedily rots canvas, and therefore a coat of oil paint would not be, as stated, a protection to the back of prepared canvas: better use paraffin, which does not oxidise. Space will not allow a further notice of the concluding chapters of this work. One or two points, however, seem to require remark. "If darkening of a picture is due to some chemical action in the colours themselves, which is not unfrequently the case, the original condition of the work cannot be restored." If the darkening be due to the action of sulphuretted hydrogen or white lead, the whiteness can be restored by washing with peroxide of hydrogen.

In the directions given for painting the walls of the painting-room it is advised to use prussian blue, and the vehicle to be employed is spoken of as distemper colour. prussian blue is immediately decomposed by lime or chalk, and therefore cannot be used with these materials.

On the whole, one feels great pleasure in recommending this book as useful to art students. As has been before stated, it is matter for regret that parts of it have not been more fully treated, and at the same time it must be observed that, as regards scientific questions involved in the composition of pigments and on their action on one another, as well as the adulterations with which they are contaminated, the subject is almost wholly untouched, and we must look for some further treatise to illustrate and explain these points, either from Mr. Muckley or from some other author.

A VISIT TO ETNA

Un Viaggio all' Etna. Del Prof. Orazio Silvestri, di Firenze, Presidente del Club Alpino Italiano a Catania. (Torino : Ermanno Loescher, 1879.)

THE Italian Alpine Club has branches in all the principal cities of the kingdom, and a good deal of useful work is done every year by its members. The work before us is designed not only for the benefit of the Club, but to foment and foster a greater taste among Italians for exploration, by setting before them a history of their most famous mountain, and detailing the very varied incidents to be met with in a journey to its summit. The book is divided into eight chapters, and is furnished with an appendix, which contains a list of the principal monticules on the slopes of Etna, with their altitude and

position; the altitude of the principal towns on and around the mountain; and (to prevent imposition) the tariff established by the Catanian branch of the Alpine Club for the ascent of the mountain, and for visiting points of interest on its flanks.

The population of the mountain is rapidly increasing. In 1871 it amounted to 314,092, divided between thirty-nine cities, towns, and villages. The largest of these—Catania—contains 84,397 inhabitants; the smallest—S. Agata di Battiati—507.

The first chapter of the "Viaggio" carries the traveller from Turin to Naples, from Naples to Messina, and from Messina to Catania. The passing glimpses of Vesuvius and Stromboli are described, and the beautiful coast scenery between Messina and Catania, which embraces the Capo di Taormina, one of the most picturesque spots in Europe. The second chapter describes the ascent as far as Nicolosi, the last village on the route to the summit. In its immediate neighbourhood are the Monti Rossi, formed during the eruption of 1669, which is described at some length.

Starting from Nicolosi (Chapter III.), the traveller passes over the lava of 1537, and presently enters the *Regione Selvosa*; he notes the numerous groups of monticules scattered in various directions, rests at the Casa del Bosco, 235 metres higher than Vesuvius; and later on continues his journey through a region in which the vegetation becomes more and more sparse until he arrives at the Casa Inglese, near the foot of the great cone. Here the author bursts out into an "Inno alla Natura" improvised by the poet Mario Rapisardi on the occasion of his visit to the summit, and of which the following is a specimen:—

" Sorridi a noi, sorridi,
O Dea! sia che de l'Etna
T'amiamo oggi invocar,
O dai pietrosi lidi,
Ove fuggente e pavido
Scagliossi il poveretto Aci nel mar."

About two o'clock in the morning the traveller leaves the Casa Inglese for the summit (Chapter IV.). The severe climb up the cone of cinders (angle from 32° to 35°) is attended by some difficulty of respiration, both from the rarity of the atmosphere, and the presence of volcanic exhalations. The phenomena preceding sunrise are described, the gradual illumination of the scene, and the projection of the shadow of the mountain over Sicily. An account of the appearance of the great crater concludes this chapter. A description of the eastern flank of Etna and the Val del Bove furnishes the matter for the two succeeding chapters. The geology of the mountain is herein discussed; specially the theory of two axes of eruption, warmly supported by Lyell and other geologists.

After resting a night at Giarre, the traveller visits the eruptive craters of 1865, passing by the villages of S. Giovani and S. Alfio, and through the wood of Carpinetto, which contains the celebrated *Castagno del Cento Cavalli*. A detailed account of the eruption of 1865 which was minutely studied by Prof. Silvestri, is given in this part of the book (Chapter VII.). The last chapter is a very comprehensive one. It takes the reader completely round the northern, western, and southern flanks

of the mountain, by way of Randazzo, Bronte, Adernò, Paterno, and Monte Ste. Anastasia, and so back to Catania. Reflections on the results of the journey are concluded by a persevering peroration, in which the author reminds us that from the top of Etna we may see nearly the whole of that beautiful island which the ancient poets symbolised as "La bionda e leggiadra figlia di Cerere e del sole," and the moderns yet more happily as "la fulgida perla dell' Italico diadema circondata da tre puri zaffiri; il Tirreno, il Jonio, l'Africano" . . .

The book is not illustrated, but it contains a clear and very accurate map of Etna, reduced from that of von Waltershausen, and with the addition of the eruptions subsequent to 1843. Prof. Silvestri's style, while it is accurate and precise from the scientific standpoint, is never dull or lagging. He carries his reader with him, and excites a genuine enthusiasm, which all who know him can well understand.

G. F. RODWELL

OUR BOOK SHELF

Methods and Theories for the Solution of Problems of Geometrical Construction, Applied to 410 Problems.

By Julius Petersen.

Text-book of Elementary Plane Geometry. By the same. (London: Sampson Low, 1880.)

SOME months since we noticed Prof. Petersen's "Theorie der algebraischen Gleichungen," and now we desire to draw attention to two more works by the same writer. The former, in its Danish garb, appeared so long ago as the year 1866, and having been tried and found to be a successful text-book, the author naturally desired to offer his work to a wider circle of geometers and students. The "Methods" has been rendered also into French; it is "an attempt to teach the student how to attack a problem of construction." Solutions in most cases are merely indicated, the following up the author's remarks being left to the student or teacher. The first chapter treats of "Loci" (method of similitude and inverse figures); the second of "Transformation of the Figures" (parallel translation, replacing, and revolution around an axis); the third of "The Theory of Revolution," with an appendix on systems of circles and on the possibility of solving a given problem by the straight edge and pair of compasses. It is a work of considerable merit. The "Text-book" we do not value so highly, though there are points of interest and novelty about it also; it contains besides 228 geometrical exercises. We hail Prof. Petersen as a valuable coadjutor in the work of improving geometrical teaching, and shall be glad if his little books meet with a fair measure of acceptance in this country. We could point out what we consider blemishes, but in the main commend both books. The respective translators (both, we presume, Danish students) have done their part intelligently, and English students will have no difficulty in understanding the language, though they may not be able to master the matter.

Practical Chemistry. The Principles of Qualitative Analysis. By W. A. Tilden, D.Sc. (Longmans and Co., 1880).

OF making books on practical chemistry there is no end. If it were necessary that another should be added to the list, the publication of this little book by Dr. Tilden has surely removed the necessity.

There is no special feature to be noted in this book: it is clearly and accurately written, and proceeds on the well-beaten paths. The adoption of a general table printed on strong paper and protected by cloth backing is to be commended.

It is, we think, doubtful whether anything is to be

gained by attempting to teach mere outlines of the methods for analysis of mixtures; a more thorough grounding in qualitative analysis may, as a rule, be given by limiting the student's work for some time to simple salts—which is not such an extremely easy branch of analysis as may at first sight appear; then proceeding to mixtures of metals with one metal only in each group; then to mixtures of various metals of the same group; and lastly to complex mixtures.

The detection of acids—even of a simple acid—is made, as is usual in elementary text-books, to appear a much less difficult undertaking than it really is.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

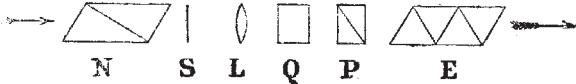
A Rotatory Polarisation Spectroscope of Great Dispersion

I HAVE just had an opportunity of trying, on a fine aurora, an instrument for measuring the wave-length of monochromatic light in terms of quartz-rotation of its plane of polarisation. My apparatus is, as yet, very roughly put together, so that I got no measurements of any value, but to-night's experience has shown me that the method, while simple in application, is capable of very great accuracy.

The construction of the instrument will be easily understood from the annexed rough sketch. The course of the light is with the arrows. *N* is a Nicol, *S* an adjustable slit, *L* a lens at its focal distance from *S*, *Q* a plate of quartz cut perpendicularly to the axis, *P* a double-image prism, and *E* a small direct-vision spectroscope, which may be dispensed with when absolutely monochromatic light is to be examined.

When the instrument is properly adjusted by daylight the two images of *S* formed by *P* are parts of a straight line, so that *E* gives two spectra side by side. These are crossed by dark bands, which are numerous in proportion to the thickness of *Q*, and which move along the spectra as *N* is made to rotate.

In observing a bright-line spectrum the slit is to be made as wide as possible, subject to the condition that no two of the



differently-coloured images shall overlap. We have thus a pair of juxtaposed rectangles for each of the bright lines, and the angular positions of *N*, when the members of the several pairs are equally bright, are read off on a divided head. I find by trial that a division to 2° is quite sufficient.

A first set of readings is taken with a plate *Q* (permanently fixed in the instrument) 5 or 6 millimetres thick. Then an additional plate of quartz 100 millimetres or more thick is introduced between *Q* and *L*, and a second set of readings is taken. From the readings with the thin plate we find approximately the positions of the spectral lines, and the more exact determination is obtained from the readings with the thick plate.

This is the chief feature of the instrument. The actual error of any one reading is not more than 2° , but when a thick plate is used the whole rotation may be from ten to twenty or even thirty circumferences. By thus increasing the thickness of the quartz plate very little additional loss of light is incurred, while the inevitable error forms a smaller and smaller fraction of the whole quantity to be measured.

The graduation of the instrument is to be effected by very careful measurements upon a hydrogen Geissler tube, and comparison with the known wave-lengths of the hydrogen lines.

An observer furnished with this instrument (which is not much larger than a pocket spectroscope) and with a long rod of